

What is claimed is:

1. A snowmobile comprising:  
a frame having a forward portion and a rear portion, said frame including a pair of skis supporting said forward portion and an endless drive track supporting said rear portion, an engine supported in said frame, a drive train connected to said engine and to said endless drive track, said drive train including a planetary gear system, said planetary drive system including a first shaft means and sun gear, said first shaft means being driven by said engine, planetary gears driveably engaged with said sun gear, and second shaft means including means engaged with said planetary gears, said second shaft means being driven by said planetary gears, said second shaft means driving said endless drive track.

2. The snowmobile of claim 1 wherein said planetary gear system is driven by said engine engaging through a clutch system.

3. The snowmobile of claim 2 wherein said planetary gear system comprises four planetary gears and wherein said four planetary gears are equally spaced around said sun gear.

4. The snowmobile of claim 1 wherein said planetary gear system includes a plurality of planetary gears equally spaced around said sun gear.

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5. The snowmobile of claim 4 wherein said planetary gear system comprises three planetary gears.

6. The snowmobile of claim 4 wherein said second shaft means drives a differential and wherein said differential drives said endless drive track.

7. The snowmobile of claim 6 wherein said first shaft means includes a first end adjacent said engine and a second end adjacent said sun gear and wherein said first shaft means is supported on a pair of ring bearings, the first of said pair of ring bearings being disposed adjacent said first shaft end and the second of said pair of ring bearings being disposed adjacent said second end of said first shaft means.

8. A snowmobile clutch system comprising:  
a planetary gear system, said planetary drive system including a first shaft means including a sun gear, said first shaft means being adapted for driving engagement with a snowmobile engine, planetary gears drivenly engaged with said sun gear, and second shaft means including means engaged with said planetary gears, said second shaft means being driven by said planetary gears;  
primary clutch means in driven engagement with said second shaft means;  
secondary clutch means adapted for driving the track of a snowmobile; and  
belt means interconnecting said primary clutch means and said secondary clutch means.

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9. The snowmobile of claim 8 wherein said planetary gear system comprises four planetary gears and wherein said four planetary gears are equally spaced around said sun gear.

10. The snowmobile of claim 9 wherein said planetary gear system includes a plurality of planetary gears equally spaced around said sun gear.

11. The snowmobile of claim 10 wherein said planetary gear system comprises three planetary gears.

12. A snowmobile comprising:

a frame having a forward portion and a rear portion, said frame including a pair of skis supporting said forward portion and an endless drive track supporting said rear portion, an engine supported in said frame, a drive train connected to said engine and to said endless drive track, said drive train including a reduction drive comprising a planetary gear system, said planetary drive system including a first shaft means and sun gear, said first shaft means being driven by said engine, planetary gears drivenly engaged with said sun gear, and second shaft means including ring gear means engaged with said planetary gears, said second shaft means driving said endless drive track.

13. The snowmobile of claim 12 wherein said planetary gear system includes a first shaft, said first shaft having a sun gear mounted at one and the opposite end of said first shaft being in driven engagement with said engine, said planetary gear system further

including a second shaft, said second shaft having ring gear disposed at the first end of said shaft, and a plurality of planetary gears disposed between said sun gear and said ring gear, said planetary gears being driven by said sun gear and said planetary gears serving to drive said ring gear.

14. The snowmobile of claim 13 wherein said planetary gears are equally spaced around said sun gear.

15. The snowmobile of claim 14 wherein said planetary gears are supported in spaced relationship by ring plate means.

16. The snowmobile of claim 15 wherein said ring plate means comprise a pair of ring plates, one of said ring plates being disposed on each side of said planetary gears.

17. The snowmobile of claim 16 wherein said ring plate means further including a plurality of planetary shafts, each of planetary shafts rotatably supporting one of said planetary gears.

18. The snowmobile of claim 17 wherein said reduction drive provides a reduction in the ratio of 1:3.

19. The snowmobile of claim 17 wherein said first shaft includes a stub shaft extending beyond said sun gear and wherein said stub shaft is supported in a roller bearing.

20. The snowmobile of claim 19 wherein said second shaft is supported in a roller bearing disposed adjacent said ring gear.

21. A snowmobile including  
an engine with a drive shaft;  
a differential and a track;  
a planetary gear system interconnecting said engine drive shaft and said differential.

22. The snowmobile of claim 21 wherein said planetary gear system comprises a sun gear, a plurality of planetary gears and a ring gear, wherein said planetary gears serve to provide driving power from said sun gear to said ring gear.

23. The snowmobile of claim 22 wherein said sun gear is integrally mounted on the drive shaft of said engine.

24. The snowmobile of claim 23 wherein said planetary gears comprise four planetary gears.

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25. The snowmobile of claim 24 wherein said planetary gears comprise three planetary gears.

26. The snowmobile of claim 25 wherein said sun gear and engine drive shaft are rotatably supported in bearing means associated with said ring gear and drive shaft.

27. A snowmobile reduction gear system comprising a planetary gear system for interconnecting a snowmobile engine drive shaft and a differential, said planetary gear system including a drive shaft and integral sun gear, a plurality of planetary gears disposed around said sun gear and a driven shaft and integral ring gear, wherein said sun gear is adapted to be driven by an planetary gears serve to provide driving power from said sun gear to said ring gear.

28. A snowmobile comprising:

a frame having a forward portion and a rear portion, said frame including a pair of skis supporting said forward portion and an endless drive track supporting said rear portion, an engine supported in said frame, a drive train connected to said engine and to said endless drive track, said drive train including a primary clutch, a secondary clutch and a planetary gear system, said primary clutch and said secondary clutch being interconnected by a belt, said planetary drive system including a first shaft means and sun gear, said first shaft means being driven by said engine through said primary clutch, said belt, and said secondary clutch, said planetary gears being drivenly engaged with said sun gear, and second shaft means including means engaged with said planetary gears, said

second shaft means being driven by said planetary gears, said second shaft means driving said endless drive track.

29. The snowmobile of claim 28 wherein said planetary gear system comprises four planetary gears and wherein said four planetary gears are equally spaced around said sun gear.

30. The snowmobile of claim 28 wherein said planetary gear system includes a plurality of planetary gears equally spaced around said sun gear.

31. The snowmobile of claim 30 wherein said planetary gear system comprises three planetary gears.

32. The snowmobile of claim 33 wherein said second shaft means drives a differential and wherein said differential drives said endless drive track.

33. The snowmobile of claim 32 wherein said first shaft means includes a first end adjacent said engine and a second end adjacent said sun gear and wherein said first shaft means is supported on a pair of ring bearings, the first of said pair of ring bearings being disposed adjacent said first shaft end and the second of said pair of ring bearings being disposed adjacent said second end of said first shaft means.

34. A snowmobile comprising:

a frame having a forward portion and a rear portion, said frame including a pair of skis supporting said forward portion and an endless drive track supporting said rear portion, an engine supported in said frame, a drive train connected to said engine and to said endless drive track, said drive train including a clutch system, said clutch system including a reduction drive comprising a planetary gear system, said planetary drive system including a first shaft means and sun gear, said first shaft means being directly driven by said engine, planetary gears drivenly engaged with said sun gear, and second shaft means including ring gear means engaged with said planetary gears; primary clutch means driven by said second shaft means, secondary clutch means and belt means providing driving engagement between said primary clutch means and said secondary clutch means, said secondary clutch means serving to drive said endless track.

35. A snowmobile including  
an engine with a drive shaft;  
a differential and a track;  
a clutch system including a planetary gear system interconnecting  
said engine drive shaft and said differential.

36. A snowmobile comprising:  
a frame having a forward portion and a rear portion, said frame including a pair of skis supporting said forward portion and an endless drive track supporting said rear portion, an engine supported in said frame, a drive train connected to said engine and to said endless drive track, said drive train including a planetary gear system, primary clutch

and a secondary clutch, said primary clutch and said secondary clutch being interconnected by a belt, said planetary drive system including a first shaft means and sun gear, said first shaft means being driven by said engine, said planetary gears being drivenly engaged with said sun gear, and second shaft means including means engaged with said planetary gears, said second shaft means being driven by said planetary gears, said second shaft means driving said endless drive track through said primary clutch and said secondary clutch.

37. The snowmobile of claim 36 wherein said second shaft means drives said primary clutch.

38. The snowmobile of claim 37 wherein said first shaft means includes a first end adjacent said engine and a second end adjacent said sun gear and wherein said first shaft means is supported on a pair of ring bearings, the first of said pair of ring bearings being disposed adjacent said first shaft end and the second of said pair of ring bearings being disposed adjacent said second end of said first shaft means.

39. A snowmobile comprising:

- (a) a frame having a forward portion and a rear portion, said frame including a ski supporting said forward portion, and said frame including an endless drive track;
- (b) an engine supported in said frame;
- (c) a drive train connected to said engine and to said drive track, wherein said drive train comprises:

(i) an engine drive shaft capable of being rotated by the engine, the engine drive shaft having a first longitudinal axis;

(ii) a track shaft having a second longitudinal axis;

(iii) a sprocket coupled to the track shaft wherein rotation of the track shaft causes rotation of the sprocket, and wherein the sprocket drives the endless drive track;

(iv) a continuously variable transmission connecting the engine drive shaft to the track shaft wherein the engine drive shaft drives the track shaft through the continuously variable transmission; and

(v) a planetary gear system having an input shaft and a second shaft, wherein the engine drive shaft drives the input shaft and the second shaft drives the track shaft, wherein the input shaft and the second shaft are coaxial with one of the axes selected from the group consisting of the first longitudinal axis and the second longitudinal axis, wherein there exists a gear reduction from the input shaft to the second shaft.

40. ~~The snowmobile according to claim 39 wherein the input shaft and the second shaft are coaxial with the first longitudinal axis, and wherein the input shaft is connected to and driven by the engine drive shaft, and wherein the second shaft is connected to and drives the continuously variable transmission.~~

41. ~~The snowmobile according to claim 40, wherein the input shaft and the engine drive shaft are a single integral shaft.~~

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42. The snowmobile according to claim 39, wherein the input shaft and the second shaft are coaxial with the second longitudinal axis, and wherein the input shaft is connected to and driven by the continuously variable transmission, and wherein the second shaft is connected to and drives the track shaft.

43. The snowmobile according to claim 42, wherein the second shaft and the track shaft are a single integral shaft.

44. The snowmobile according to claim 39, wherein the gear reduction ratio caused by the planetary gear system is between 1:1 and 6:1.

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45. A snowmobile comprising:

- (a) a frame having a forward portion and a rear portion, said frame including a ski supporting said forward portion, and said frame including an endless drive track;
- (b) an engine supported in said frame; and
- (c) a drive train connected to said engine and to said endless drive track, wherein said drive train comprises:
  - (i) a planetary gear system including a input shaft and a second shaft coaxial with the input shaft, wherein the input shaft is driven by the engine and the second shaft is driven by the input shaft with a gear reduction from the input shaft to the second shaft; and

(ii) a sprocket that rotates about an axis, wherein the sprocket is coaxially connected to and driven by the second shaft, and wherein the sprocket drives the endless drive track.

46. The snowmobile according to claim 45, wherein the planetary gear system further comprises:

(a) a sun gear connected to the input shaft, wherein the sun gear defines an opening;

(b) a ring gear wherein the ring gear is rotationally stationary; and

(c) a planetary cage assembly engaged with the sun gear and the ring gear, wherein the planetary cage assembly comprises:

(i) a weight bearing protrusion connected to the second shaft, wherein the weight bearing protrusion is received by the opening in the sun gear, wherein the weight bearing protrusion supports the sun gear;

(ii) a cage connected to the second shaft wherein rotation of the cage results in rotation of the second shaft; and

(iii) a plurality of planetary gears supported by the cage, wherein the planetary gears gearingly mesh with the sun gear and the ring gear, wherein rotation of the sun gear causes rotation of the planetary gears, and wherein rotation of the planetary gears within the ring gear cause the planetary cage assembly including the second shaft to rotate.

47. The snowmobile according to claim 45, wherein the drive train further comprises a continuously variable transmission, wherein the continuously variable transmission is driven by the engine and wherein the continuously variable transmission drives the planetary gear system.

48. The snowmobile according to claim 47, wherein the continuously variable transmission comprises a primary clutch, a belt, and a secondary clutch, wherein the primary clutch is driven by the engine, wherein the secondary clutch is connected to the primary clutch by the belt, wherein the secondary clutch is driven by the primary clutch, and wherein the secondary clutch is coupled to and drives the planetary gear system.

49. A snowmobile comprising:

(a) a frame having a forward portion and a rear portion, said frame including a pair of skis supporting said forward portion, and said frame including an endless drive track;

(b) an engine supported in said frame; and

(c) a drive train connected to said engine and to said endless drive track, said drive train consisting essentially of:

(i) an engine drive shaft capable of being rotated by the engine, the engine drive shaft having a first longitudinal axis;

(ii) a track shaft having a second longitudinal axis;

(iii) a sprocket coupled to the track shaft wherein rotation of the track shaft causes rotation of the sprocket, and wherein the sprocket drives the endless drive track;

(iv) a continuously variable transmission connecting the engine drive shaft to the track shaft wherein the engine drive shaft drives the track shaft through the continuously variable transmission; and

(v) a planetary gear system having an input shaft and a second shaft, wherein the engine drive shaft drives the input shaft and the second shaft drives the track shaft, wherein the input shaft and the second shaft are coaxial with one of the axes selected from the group consisting of the first longitudinal axis and the second longitudinal axis, wherein there exists a gear reduction from the input shaft to the second shaft

50 A planetary gear system for a snowmobile comprising:

(a) an input shaft;

(b) a sun gear connected to the input shaft, wherein the sun gear defines an opening;

(b) a ring gear wherein the ring gear is rotationally stationary; and

(c) a planetary cage assembly engaged with the sun gear and the ring gear, wherein the planetary cage assembly comprises:

(i) a cage member;

(ii) a second shaft connected to the cage member, wherein rotation of the cage member causes rotation of the second shaft;

(iii) a weight bearing protrusion connected to the cage and received by the opening in the sun gear, wherein the weight bearing protrusion supports the sun gear; and

(iv) a plurality of planetary gears supported by the cage wherein the planetary gears gearingly mesh with the sun gear and the ring gear, wherein rotation of the sun gear causes rotation of the planetary gears, and wherein rotation of the planetary gears within the ring gear cause the planetary cage assembly including the second shaft to rotate.

51. The planetary gear system according to claim 50, wherein the plurality of planetary gears comprises four planetary gears.

52. The planetary gear system according to claim 50 further comprising a double roller bearing connected to the weight bearing protrusion and received by the opening in the sun gear.

53. The planetary gear system according to claim 50, wherein the second shaft includes a distal end opposite from the connection to the weight bearing protrusion, wherein the distal end of the second shaft comprises a male splined end.

54. The planetary gear system according to claim 50, wherein the second shaft includes a distal end opposite from the connection to the weight bearing protrusion, wherein the distal end of the second shaft comprises a female type end.

55. The planetary gear system according to claim 50, further comprising a housing including a first housing member and a second housing member, wherein the first housing member defines a first center opening that receives the second shaft, and wherein the second housing member defines a second center opening that receives the input shaft, and wherein the first housing member and second housing member are coupled together to create a sealed chamber between them, within which the planetary cage assembly and sun gear are at least in part positioned.

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